IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Frank Henglein, et al. Confirmation No.: 7418

Serial No.: 10/580,120 Group Art Unit: 1793

Filed: September 11, 2006 Examiner: Pegah Parvini

For: EFFECT PIGMENTS HAVING AN ALUMINUM OR ALUMINUM ALLOY CORE, PROCESS FOR THE PRODUCTION THEREOF AND USE THEREOF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

**DECLARATION UNDER 37 C.F.R. §1.132**

Sir:

I, Frank Henglein, Ph.D., do hereby declare as follows:

1. I am the same Dr. Frank Henglein, who authored the three previous declarations under 37 C.F.R: § 1.132 dated, respectively September 16, 2008, April 29, 2009, October 10, 2009 which, I am informed, have been filed in this application with the United States Patent and Trademark Office by our U.S. patent counsel.

2. My qualifications are set forth in my September 16, 2008 declaration.

3. This declaration provides additional evidence in support of the position that the claimed pigments are not obvious over the references cited in the Office Action dated February 19, 2010.

4. I have been informed that during an in-person interview the examiner requested further evidence in the form of a declaration to support the argument that a skilled person would not have coated a pigment according to Reisser, U.S. Patent No. 5,964,936, with a metal chalcogenide because such a process was thought to result in a dangerous exothermic reaction.

5. The pending claim 1 of the application calls for an effect pigment obtained by a chemical wet-process oxidation of an aluminum pigment or an aluminum alloy pigment which results in an aluminum oxide-containing layer or an aluminum oxide/hydroxide-containing layer enveloping an aluminum core or an aluminum alloy core. The aluminum oxide-containing layer or the aluminum oxide/aluminum hydroxide-containing layer is further coated with an intrinsically colored metal chalcogenide, such as iron oxide, vanadium oxide, tungsten oxide, chromium oxide or molybdenum oxide, wherein the aluminum oxide-containing or aluminum oxide/hydroxide-containing layer has a thickness of from 50 - 300 nm, and "wherein the effect pigments have a weak color flop having a $\Delta H^*_{anchor}$ in a range of between 1.5 and 50 such that the pigment exhibits a soft color flop."

6. It has been known that a strong exothermic reaction can occur when aluminum pigments are coated with a metal chalcogenide, especially iron oxide, after supplying a suitable activation energy (thermite reaction).

7. The driving force for the exothermic reaction is the extremely high enthalpy associated with the formation of aluminum oxide; i.e. oxidation of aluminum.

8. An ordinary aluminum pigment usually includes an extremely thin, naturally-occurring aluminum oxide layer with a thickness of a few nanometers (e.g. 3-5 nm). The elemental aluminum forming the core of such a pigment is a potentially active material that can react with any kind of oxides of different metals.

9. To avoid the potentially dangerous exothermic reaction caused by direct contact between a metal chalcogenide coating and the aluminum core of an ordinary aluminum pigment, it was known to coat such pigments with a metal chalcogenide (e.g. iron oxide) such that the stoichiomteric ratio of the metal chalcogenide to the aluminum surface of the pigment was kept very low.

Consequently, only a very thin layer of iron oxide was realized over an ordinary aluminum pigment. Such a thin iron oxide layer is not capable of generating interference to produce flop or the like optical behavior normally associated with effect pigments.

10. For example, before the date of the present application, there were coated pigments commercially available (see comparative examples 10 and 11) that were either gold (comparative example 10, Table 3) or orange (comparative example 11, Table 3). These coated pigments do not exhibit a color flop due to the presence of only one very thin iron oxide layer. More specifically, these kind of pigments do not exhibit the color flop of pigments according to claim 1 as can be seen from the $\Delta H^*$ values from table 4 of the specification.

11. At the time of filing of the application conventional wisdom taught away from thickening the metal chalcogenide layer due to safety concerns.

12. I have found that an aluminum pigment or an aluminum alloy pigment can be safely coated with a thick metal chalcogenide layer (thick enough to produce a color flop as set forth in claim 1) if the underlying aluminum oxide or aluminum hydroxide is a certain minimum thickness.

13. From experimental data I have concluded that the aluminum oxide layer must be at least 50 nm thick in order to allow for safely coating the aluminum pigment with a thick layer of metal chalcogenide (thick enough to produce color flop as set forth in claim 1). Thus, I have found that an aluminum oxide-containing layer or an aluminum oxide/hydroxide-containing layer that is at least 50 nm thick acts as a seal to prevent contact between the metal oxide coating and the surface of the aluminum pigment to suppress the exothermic reaction, which had previously led others away from coating an aluminum pigment with a thick metal chalcogenide layer.

14. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 06/21/2010 By: _____
Dr. Frank Henglein